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Barstow et al.

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(54) **BOAT WITH DIVE ELEVATOR**

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B63C 11/46 (2006.01)
B63B 35/40 (2006.01)

(52) **U.S. Cl.** **114/315**; 114/258

(58) **Field of Classification Search** 114/362, 114/258, 315, 313
See application file for complete search history.

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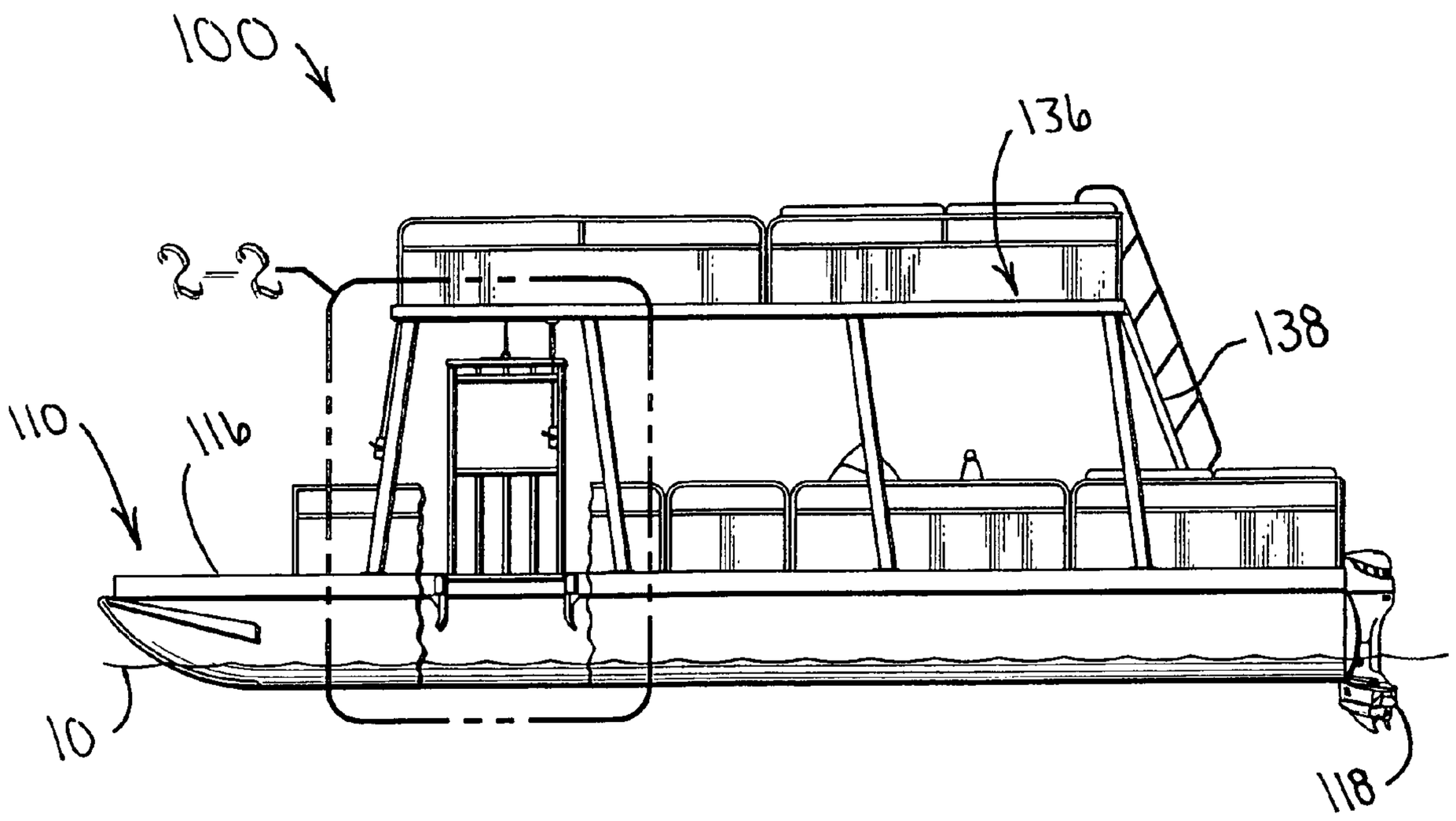
(57) **ABSTRACT**

A boat comprises an elevator and a boat hull having a deck and defining a dive opening. The dive opening extends vertically from the deck to the water and defines an enclosed passageway having upper and lower openings. Depending on the dive opening's location in the boat hull, the passageway may or may not be enclosed on all sides. Means are included for selectively moving the elevator between a raised configuration above the dive opening and a lowered configuration by passing through the passageway. A floor of the elevator is adjacent the boat hull deck when the elevator is at the raised configuration, and the elevator floor is below a water surface when the elevator is at the lowered configuration so a user may easily travel between the water and the elevator. Means for actuating the means for moving the elevator are preferably accessible from inside and outside the elevator.

15 Claims, 4 Drawing Sheets



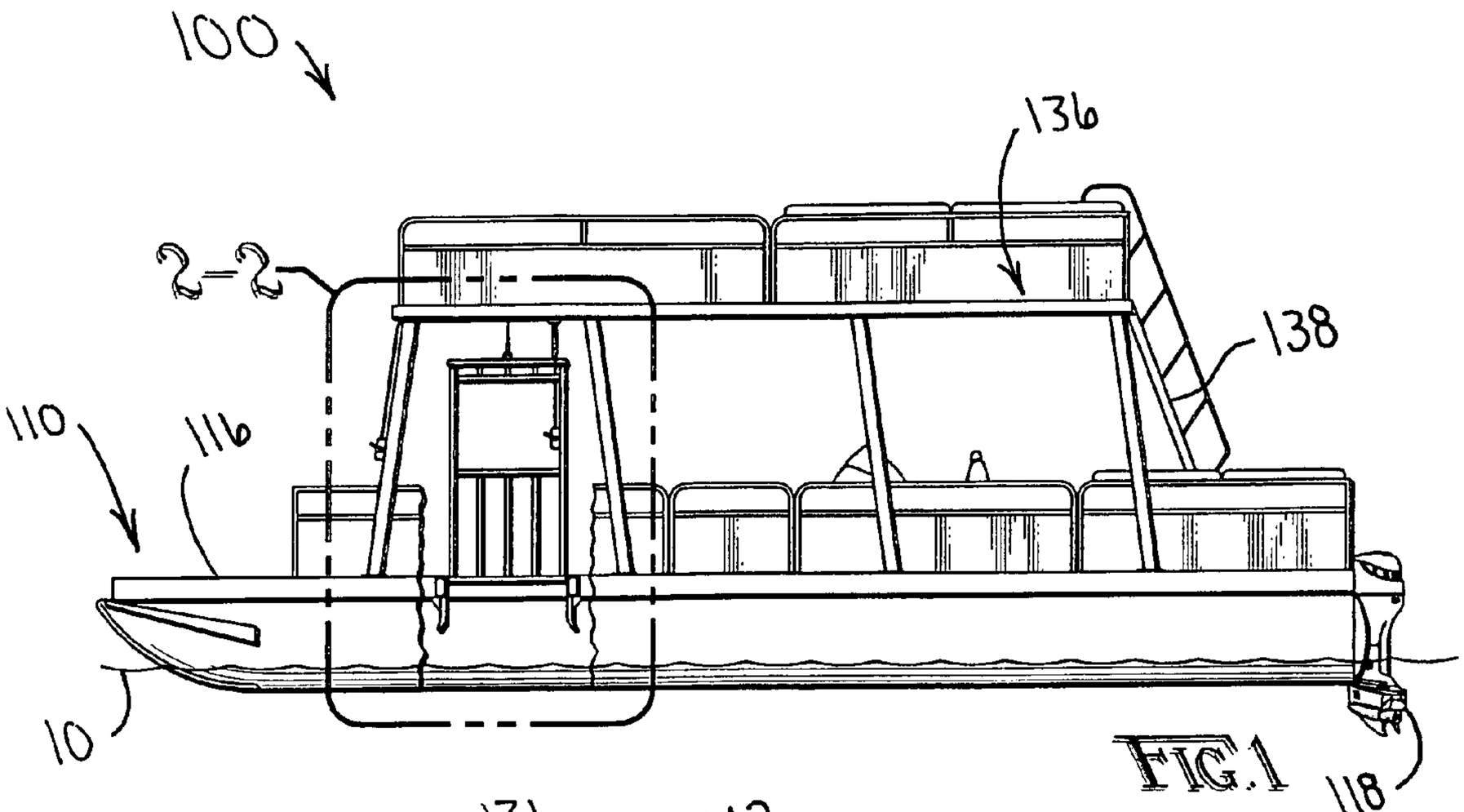

100
136
2–2
138
110
116
10
118

FIG.1

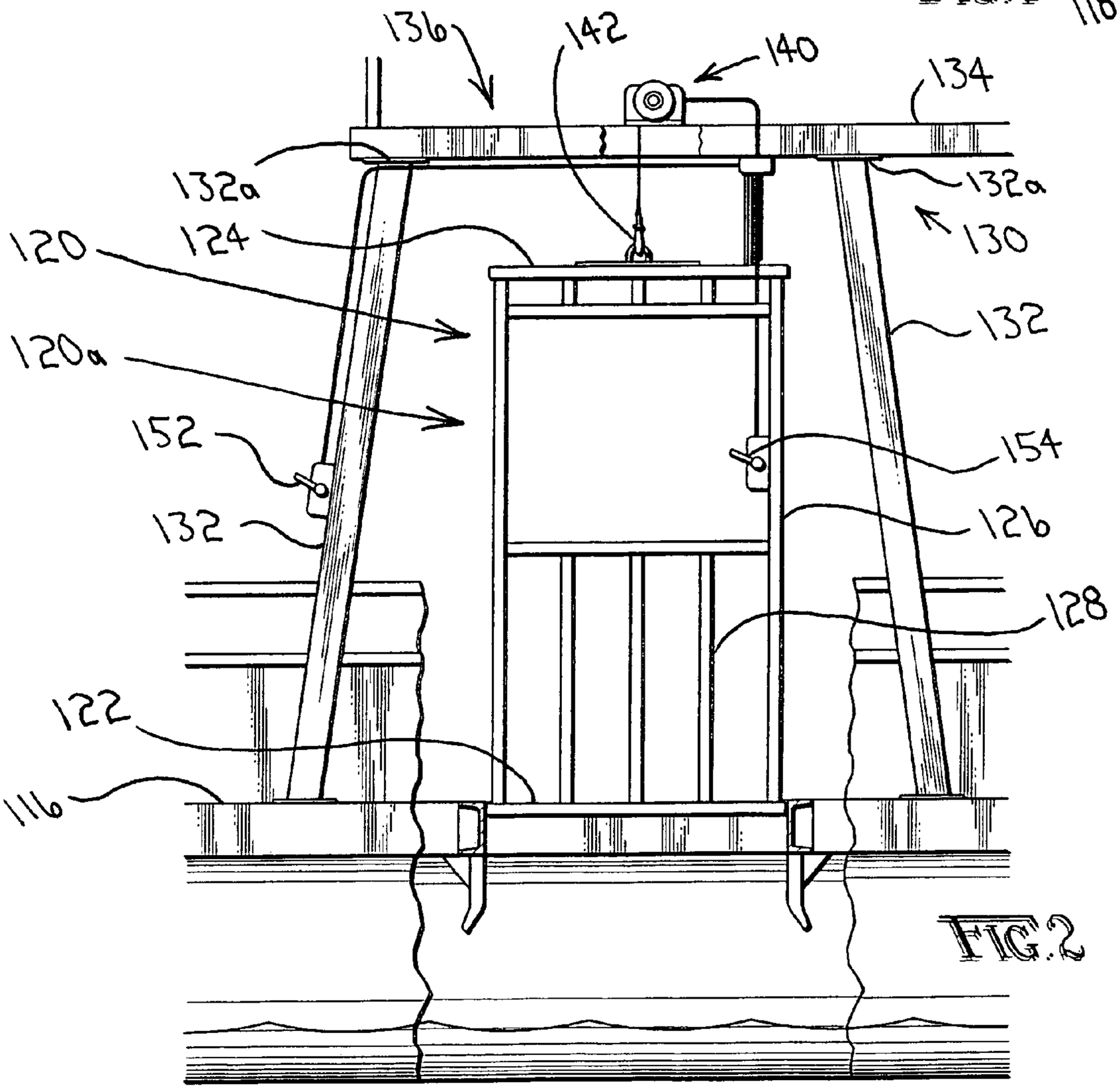

136
142
140
134
132a
132a
130
120
124
120a
132
152
154
132
126
128
122
116

FIG.2

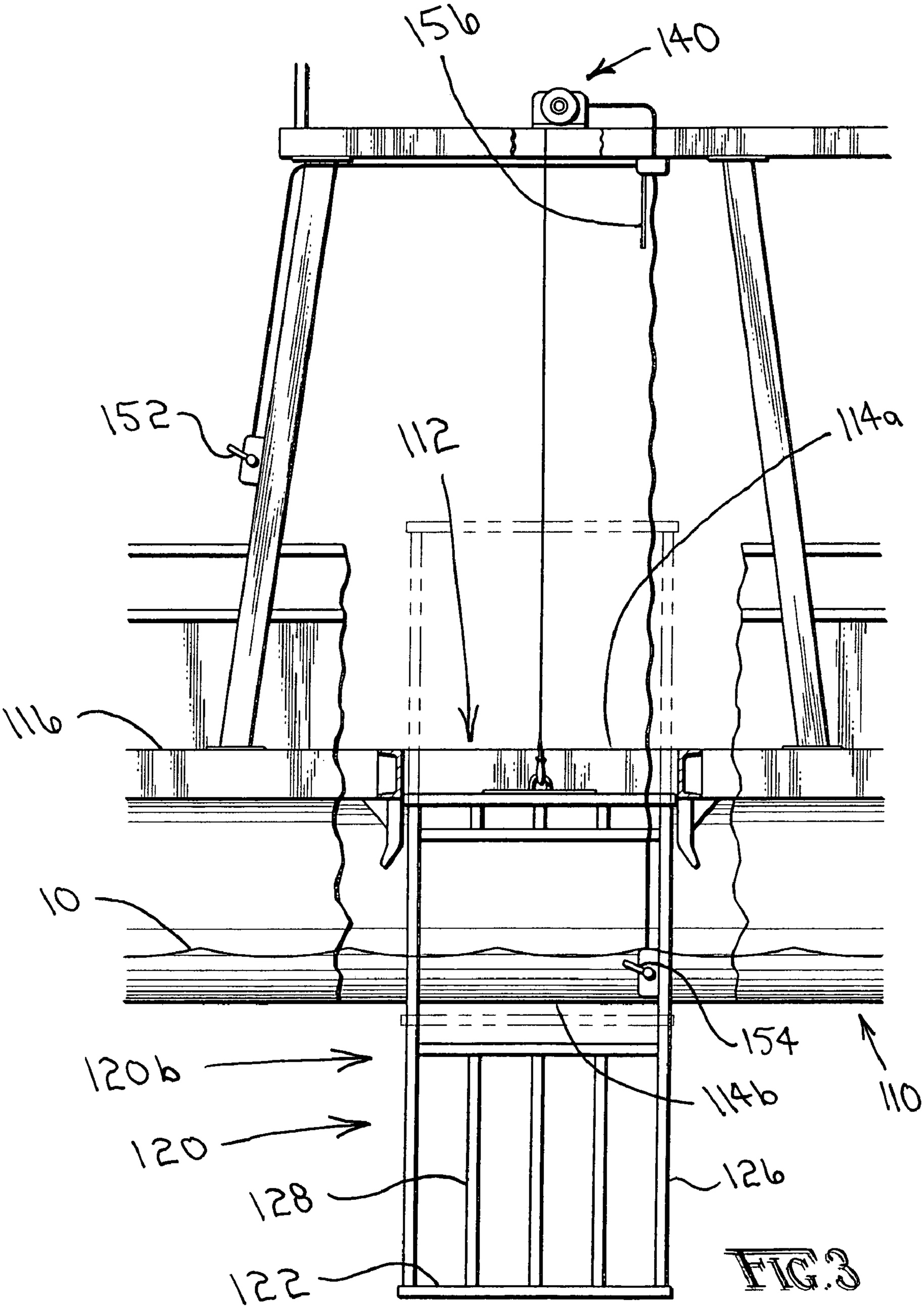


FIG.3

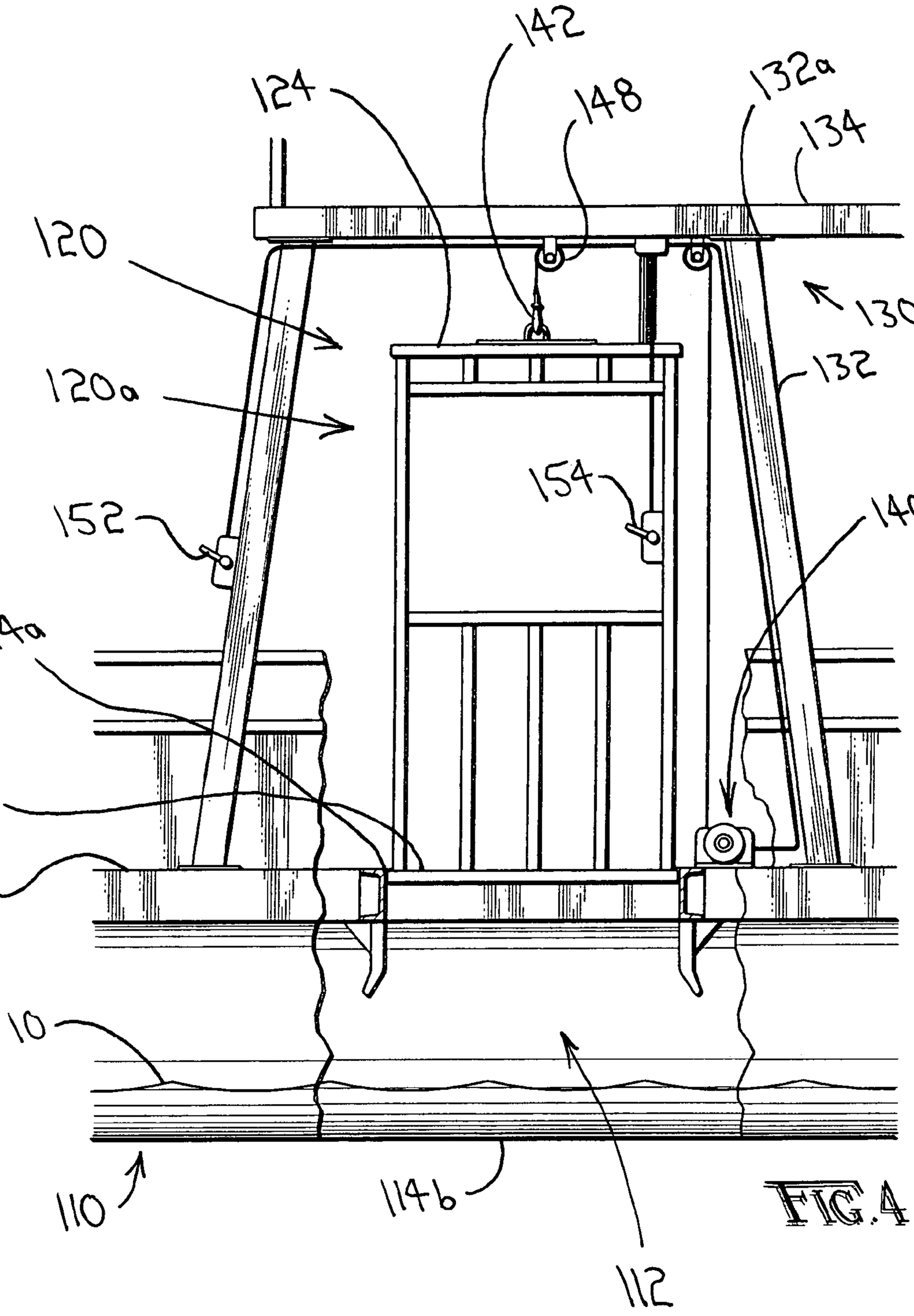

142
124
148
132a
134
120
130
120a
132
154
152
140
114a
122
116
10
110
114b
112

FIG.4

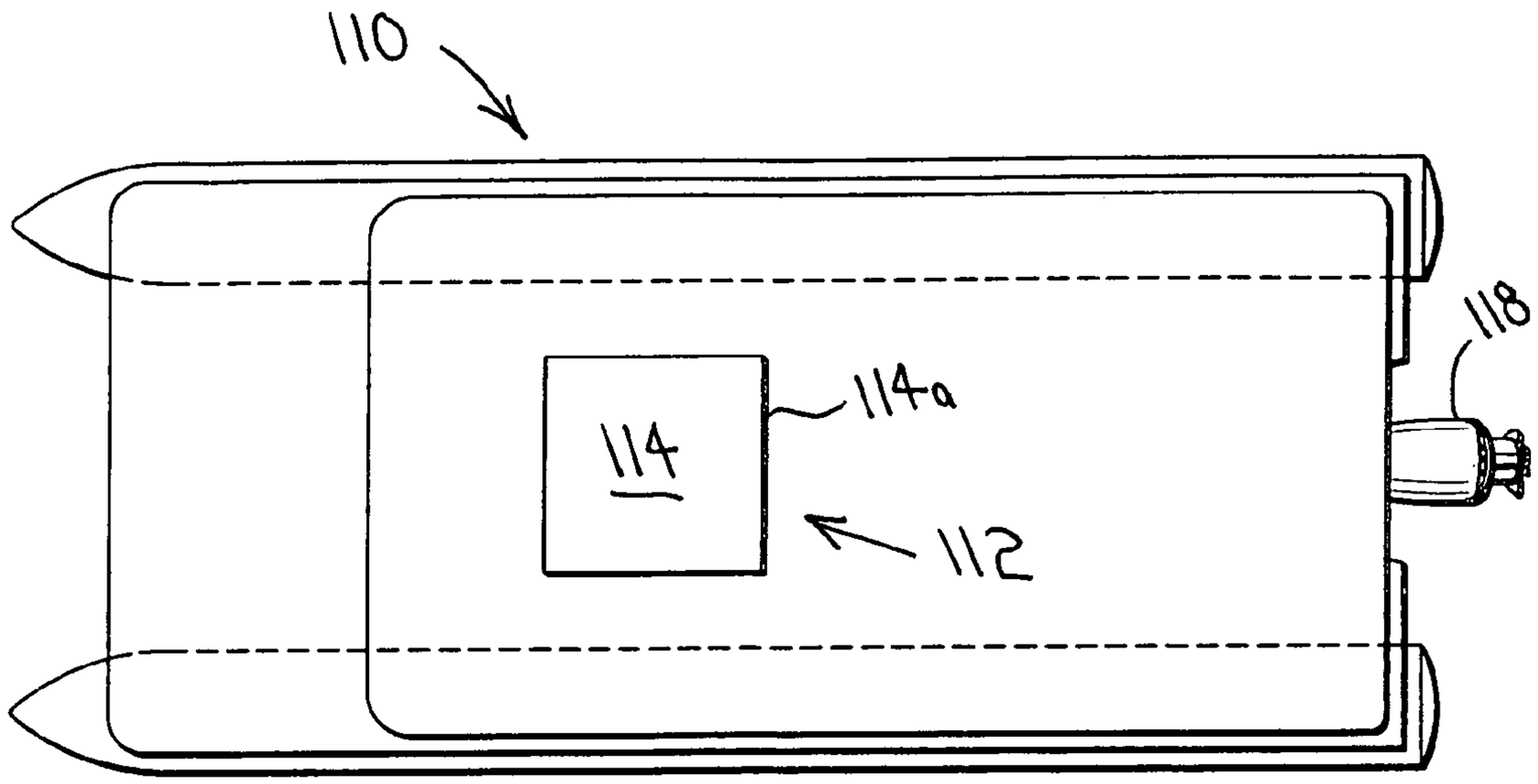


FIG.5

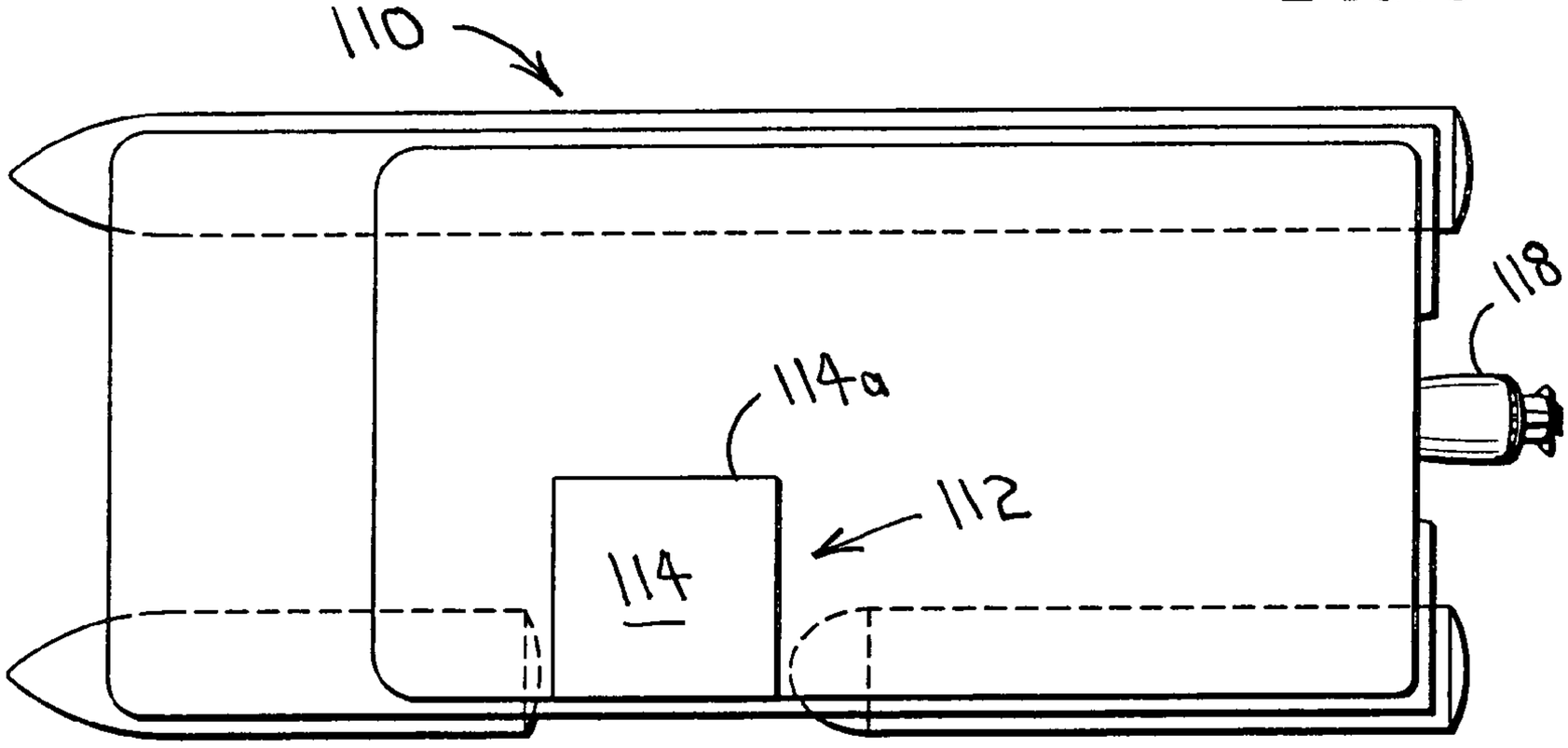


FIG.6

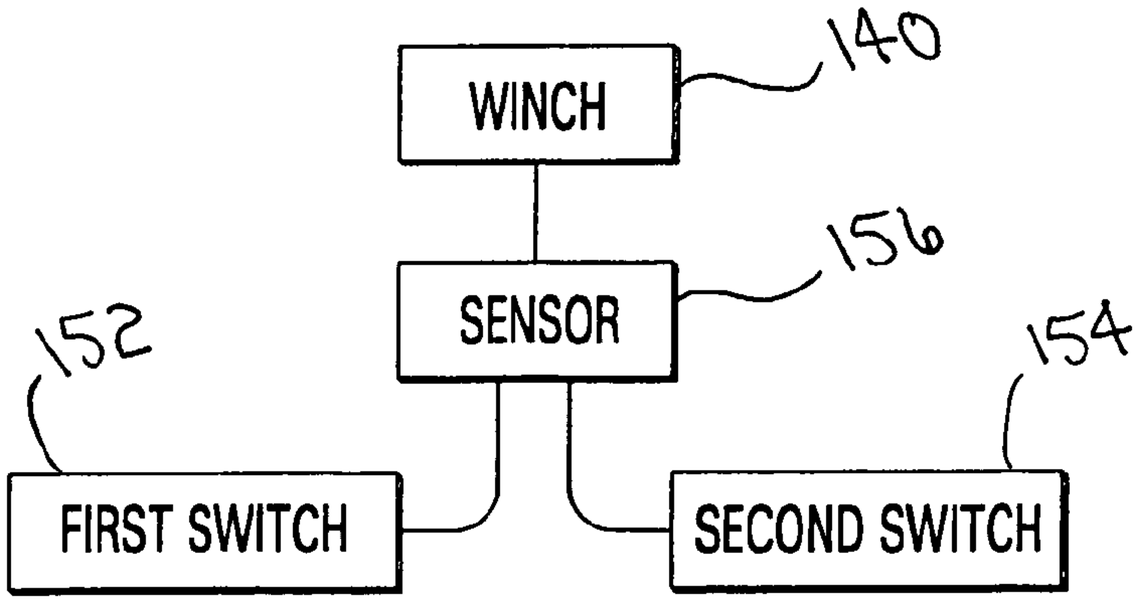


FIG.7

BOAT WITH DIVE ELEVATOR

BACKGROUND OF THE INVENTION

This invention relates generally to a boat used for diving. In particular, the present invention relates to a boat having a dive elevator for allowing a diver to easily exit and board the boat.

Water sports such as dividing and snorkeling are very popular today, and many people enjoy diving and snorkeling from a boat in order to distance themselves from land or explore various underwater locations. Part of the attraction to these sports is that many people with physical ailments (including back problems, leg injuries, arm injuries, and countless other conditions) can participate, and indeed swimming and other water activities are often suggested by medical practitioners for physical rehabilitation. Nevertheless, there has been a large obstacle to diving, swimming, and snorkeling from a boat for many people—the acts of entering the water from the boat and returning to the boat from the water.

Various proposals for platforms, ladders, and stairways that ease the exiting and boarding processes are found in the art, such as in U.S. Pat. Nos. 5,025,747; 5,537,949; 6,058,875; 6,119,809; and 6,182,598. While assembly effective for their intended purposes, these devices do not provide enough assistance to those able to dive or snorkel but unable to physically master stairs or a ladder.

In recognizing the difficulties that many people encounter when entering the water from a boat and entering a boat from the water, U.S. Pat. No. 5,887,540 discloses a mechanism chair lift system securable to a hinged stairway system for attachment to the side of a water vehicle. A user sits in a chair that is mechanically maneuvered at an angle between the boat and the water. Though this would assumably aid many people, it requires the user to sit down before being lowered and raised, and it enlarges the footprint of the boat. This seating requirement would be very difficult for those with certain ailments, such as back or hip problems, and should be avoided if possible. It would also be advantageous to keep the boat's footprint to a minimum in order to navigate shallow waters and reach certain areas. Clearly , a boat with means for transporting users to and from the water without requiring a certain configuration of the user would be advantageous since it could be used by a broader range of those with physical ailments.

SUMMARY OF THE INVENTION

A boat according to the present invention comprises an elevator and a boat hull having a deck and defining a dive opening. The dive opening extends vertically from the boat hull deck to the water and defines an enclosed passageway having an upper opening and a lower opening. Depending on the location of the dive opening in the boat hull, the passageway may be enclosed on all sides or on less than all sides. Means are included for selectively moving the elevator between a raised configuration above the dive opening to a lowered configuration. A floor member of the elevator is adjacent the boat hull deck when the elevator is at the raised configuration so a user may easily pass between the boat hull deck and the elevator, and the elevator floor member is below a water surface when the elevator is at the lowered configuration so a user may easily pass between the water and the elevator. The elevator passes through the passageway to move between the raised and lowered configurations.

Means for actuating the means for selectively moving the elevator are preferably accessible from inside and outside the elevator.

In use, the boat hull is placed in the water, and a user wishing to enter the water from the boat hull deck enters the elevator. A switch may be activated to actuate the means for selectively moving the elevator. The means for selectively moving the elevator then moves the elevator to the lowered configuration, allowing the user to easily enter the water. To board the boat from the water, the user enters the elevator at the lowered configuration from the water, and a switch is activated to actuate the means for selectively moving the elevator. The means for selectively moving the elevator then moves the elevator to the raised configuration, allowing the user to easily move to the boat hull deck from the elevator.

Therefore, a general object of this invention is to provide a boat that has a dive elevator for easily transporting users between the boat and the water.

Another object of this invention is to provide a boat, as aforesaid, with a dive elector that can be operated from both outside and inside the dive elevator.

Still another object of this invention is to provide a boat, as aforesaid, with a dive elevator that is easy and safe to use.

Yet another object of this invention is to provide a boat, as aforesaid, that does not have an exaggerated footprint.

A further object of this invention is to provide a boat, as aforesaid, that is seaworthy.

Other objects and advantages of this invention will become apparent from the following description taken in connection with the accompanying drawings, wherein is set forth by way of illustration and example, embodiments of this invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a side view of a boat with a dive elevator;

FIG. **2** is a sectional view of the dive elevator at a raised configuration, a support frame, and a winch as in FIG. **1**;

FIG. **3** is a sectional view as in FIG. **2** with the dive elevator at a lowered configuration and showing an intermediate position of the dive elevator in hidden lines;

FIG. **4** is a sectional view as in FIG. **2** with a pulley attaching the winch to the support frame;

FIG. **5** is a top view of a boat hull as in FIG. **1** with a dive shaft located in the center of the boat hull;

FIG. **6** is a top view of the boat hull as in FIG. **5** with the dive shaft located along a side of the boat hull; and

FIG. **7** is a block diagram of the winch, a sensor, and switches as in FIG. **2**.

DESCRIPTION OF THE PREFERRED EMBODIMENT

A boat according to the present invention will now be described in detail with reference to FIGS. **1** through **7** of the accompanying drawings. More particularly, a boat **100** for use in water **10** comprises a boat hull **110** defining a dive opening **112** and an elevator **120** (FIG. **1**).

The boat hull **110** has a deck **116**, and the dive opening (also called the dive shaft) **112** extends vertically from the boat hull deck **116** to the water **10**. The dive shaft **112** defines an enclosed passageway **114** having an upper opening **114***a* and a lower opening **114***b*. It is to be understood that the passageway **114** may be enclosed on all sides (FIG. **5**) or on less than all sides (FIG. **6**), depending on its location in the boat hull **110**. While the boat hull **110** is preferably a pontoon boat hull as shown in the accompanying drawings,

this does not have to be the case; other types of boat hulls may be incorporated into the current invention. Means for propelling the boat hull through the water **10**, such as a propeller **118** or a waterjet, may be included.

The elevator **120** has opposed floor and roof members **122**, **124** connected by a side member **126** and may incorporate additional elements such as railing **128** or a seat (not shown). Means are included for vertically moving the elevator **120** between a raised configuration **120***a* in which the elevator **120** rests above the dive shaft **112** and a lowered configuration **120***b* in which the elevator floor **122** is lower than the boat hull deck **116**. The elevator floor **122** is preferably adjacent the deck **116** when the elevator **120** is at the raised configuration **120***a,* and the elevator floor **122** is preferably located below a surface of the water **10** when the elevator **120** is at the lowered configuration **120***b*. The elevator **120** passes through the passageway **114** to move between the raised and lowered configurations **120***a,* **120***b*.

The means for selectively moving the elevator **120** vertically preferably comprise a winch **140** having a free end **142** attached to the elevator **120**. The free end **142** preferably attaches to the roof member **124**. Alternatively, the means for selectively moving the elevator **120** may include a hydraulic lifting system (not shown), a rack and pinion system (not shown) in which a rack is located along the elevator side member **126** and a corresponding pinion is attached to the boat hull **110** inside the dive shaft **112**, or another lifting system.

A support frame **130** is attached to the boat hull **110**. The support frame **130** comprises a first member **132** extending upwardly from the boat hull **110** and a second member **134** attached adjacent a top end **132***a* of the first member **132** and extending generally horizontally therefrom. There are preferably a plurality of first members (also called upward members) **132**, and a plurality of second members (also called horizontal members) preferably span the top ends **132***a* of the upward members **132** to create an upper deck **136** (FIG. **1**). A ladder **138** is located adjacent the support frame **130** to provide access from the deck **116** to the upper deck **136**

In a preferred embodiment, the winch **140** is operatively attached to the support frame second member **134** above the dive opening **112**. The winch **140** may be located adjacent the support frame second member **134** (FIG. **3**), or a pulley **148** may attach the winch **140** to the support frame second member **134** (FIG. **4**).

The boat **100** includes means for actuating the members for selectively moving the elevator **120**. This actuation means preferably comprises a first switch **152** in communication with the winch **140** and a second switch **154** in communication with the winch **140** (FIG. **7**). The first switch **152** is preferably mounted separate from the elevator **120** for use from outside the elevator **120**, and the second switch **154** is preferably attached to the elevator **120** for use from inside the elevator **120**. The second switch **154** should be a waterproof switch that may be safely used while submerged in the water **10**. It is understood that other means for selectively moving the elevator **120** may be incorporated, as described above.

A sensor **156** is preferably connected to the means for selectively moving the elevator **120** (such as the winch **140**) for determining when the elevator **120** is at the raised configuration **120***a* and halting the means for selectively moving the elevator **120** when the elevator **120** is at the raised configuration **120***a* (FIG. **7**).

In use, the boat hull **110** is placed in the water **10** and maneuvered as desired by the propeller **118**. When a user wishes to enter the water **10**, he passes from the deck **116** to the elevator **120**. He may stand on the elevator floor **122** and activate the second switch **154**, or someone else may activate the first switch **152** from outside the elevator **120**. Activating the first or second switch **152**, **154**, respectively, actuates the means for selectively moving the elevator **120** (preferably the winch **140**). The winch **140** in turn moves the elevator **120** vertically through the dive shaft passageway **114** to the lowered configuration **120***b* (FIG. **3**), placing the user in the water **10**. Since minimal effort is required of the user, almost anyone can enter the water **10** in this fashion, even if they have a range of physical ailments.

When the user wishes to board the boat **100** from the water **10**, he enters the elevator **120** at the lowered configuration **120***b* (FIG. **3**). He may then activate the second switch **154**, or someone else may activate the first switch **152** from outside the elevator **120**. Activating the first or second switch **152**, **154**, respectively, actuates the means for selectively moving the elevator **120** (preferably the winch **140**). The winch **140** in turn moves the elevator **120** vertically through the dive shaft passageway **114** to the raised configuration **120***a* (FIG. **2**). The sensor **156** may detect the presence of the elevator **120** at the raised configuration **120***a* and halt the winch **140**. When the elevator **120** is at the raised configuration **120***a,* the elevator floor **122** is adjacent the deck **116** and the user may easily pass from the elevator **120** to the deck **116**.

If the winch **140** is located adjacent a horizontal memer **134** of the support frame **130** (FIGS. **2** and **3**), the ladder **138** may be used to access the winch **140** for maintenance or repairs.

It is understood that while certain forms of this invention have been illustrated and described, it is not limited thereto except insofar as such limitations are included in the following claims and allowable functional equivalents thereof.

What is claimed is:

1. A boat for use in water, comprising:

a boat hull defining a dive opening;

a support frame attached to said boat hull, said support frame comprising a first member extending upwardly from said boat hull and a second member attached adjacent a top end of said first member and extending generally horizontally therefrom;

an elevator having a floor member;

a winch operatively attached to said support frame second member above said dive opening, said winch having a free end attached to said elevator for selectively moving said elevator between a raised configuration and a lowered configuration; and

a switch in communication with said winch for selectively actuating said winch.

2. The boat as in claim **1**, wherein:

said boat hull has a deck; and

said elevator floor is located below said boat hull deck when said elevator is at said lowered configuration.

3. The boat as in claim **1**, wherein:

said boat hull has a deck;

said dive opening extends vertically from said boat hull deck to the water;

said elevator floor is located below a surface of the water when said elevator is at said lowered configuration.

4. The boat as in claim **3**, wherein:

said switch is separate from said elevator; and

said boat further comprises a second switch in communication with said winch for selectively actuating said winch, said second switch being attached to said elevator.

5. The boat as in claim 4, wherein said second switch is waterproof.

6. The boat as in claim 1, further comprising a sensor connected to said winch to determine when said elevator is at said raised configuration said half said winch when said elevator is at said raised configuration.

7. The boat as in claim 1, wherein a pulley attaches said winch to said support frame second member.

8. The boat as in claim 1, wherein:

said winch is located adjacent said support frame second member; and

said boat further comprises a ladder adjacent said support frame for winch access.

9. The boat as in claim 1, wherein:

said boat hull is a pontoon boat hull; and

said boat further comprises means for propelling said boat hull through the water.

10. A boat for use in water, comprising:

a boat hull defining a dive shaft;

a support frame attached to said boat hull, said support frame comprising a plurality of upward members having respective top ends and a plurality of horizontal members spanning said top ends;

an elevator having opposed floor and roof members connected by a side member;

a winch attached to a respective said support frame horizontal member above said dive shaft, said winch having a free end attached to said elevator roof member for selectively moving said elevator between a raised configuration and a lowered configuration; and

means for actuating said winch to move said elevator between said raised and lowered configurations.

11. The boat as in claim 10, wherein:

said boat hull has a deck; and

said dive shaft extends vertically from said boat hull deck to the water, said dive shaft defining an enclosed passageway having an upper opening and a lower opening.

12. The boat as in claim 10, wherein said means for actuating said winch includes a first switch in communication with said winch.

13. The boat as in claim 12, wherein:

said first switch is separate from said elevator; and

said means for actuating said winch further comprises a second switch in communication with said winch, said second switch being attached to said elevator.

14. The boat as in claim 10, further comprising a ladder connecting said boat hull to said plurality of horizontal members.

15. A boat for use in water, comprising:

a boat hull having a deck and defining a dive shaft, said dive shaft extending vertically from said boat hull deck to the water, said dive shaft defining an enclosed passageway having an upper opening and a lower opening;

an elevator having a floor member, said elevator floor being adjacent said upper opening of said passageway when said elevator is at said raised configuration, said elevator floor being below a surface of the water when said elevator is at said lowered configuration;

means for vertically moving said elevator between a raised configuration in which said elevator rests above said dive shaft and a lowered configuration in which said elevator floor is lower than said boat hull deck, said means for vertically moving said elevator comprising a winch operatively attached to said elevator;

means for actuating said means for moving said elevator; and

a sensor operatively connected to said winch to determine when said elevator is at said raised configuration and half said winch when said elevator is at said raised configuration; and

wherein said elevator passes through said passageway to move between said raised and lowered configurations.

* * * * *